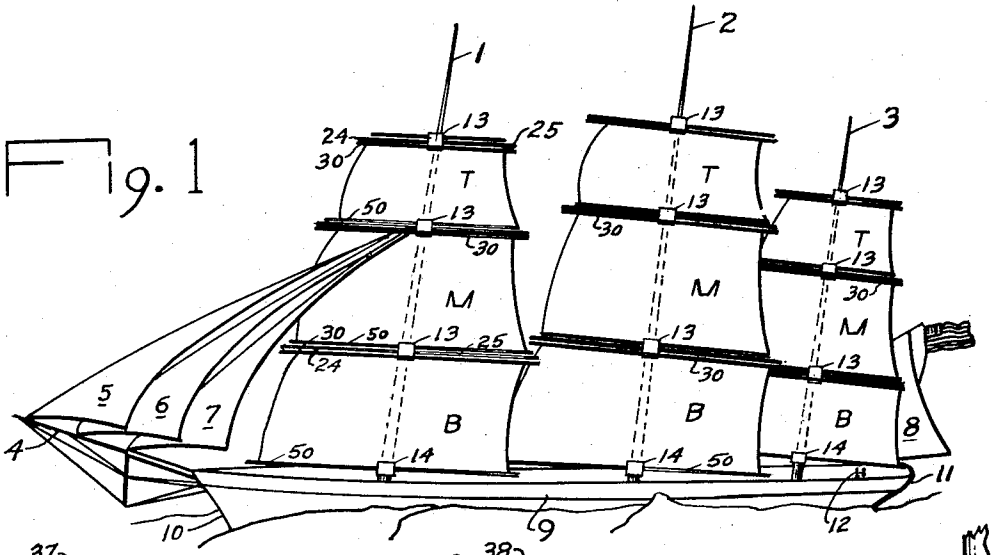
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SAILING SHIP RIGGING AND ITS OPERATION

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Fig. 1



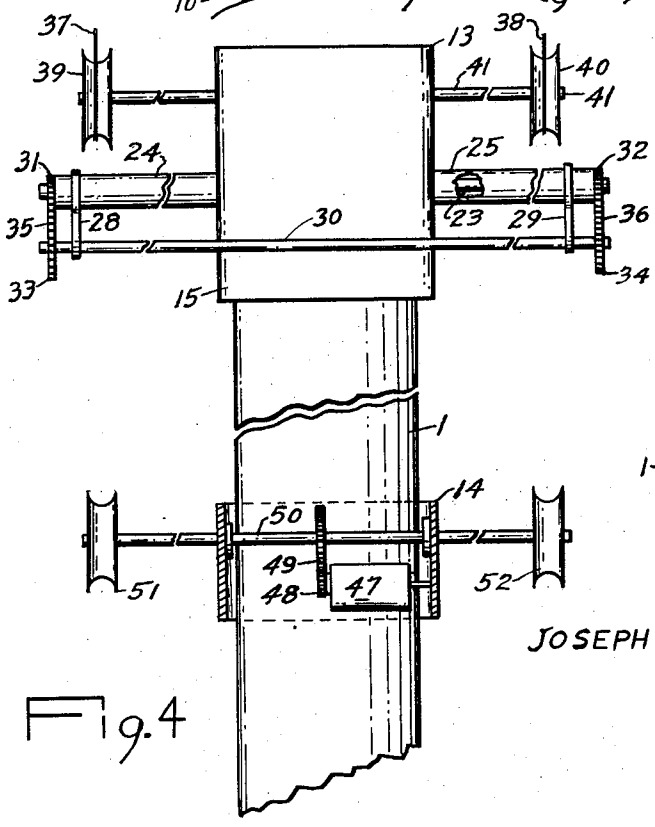


Fig. 4

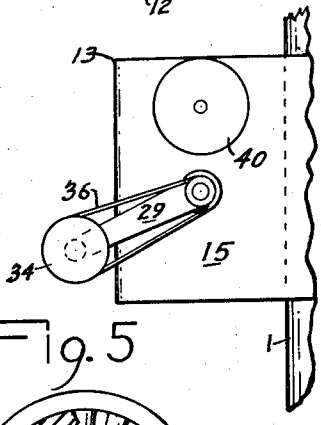


Fig. 5

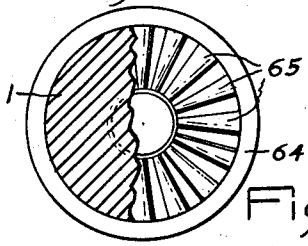


Fig. 9

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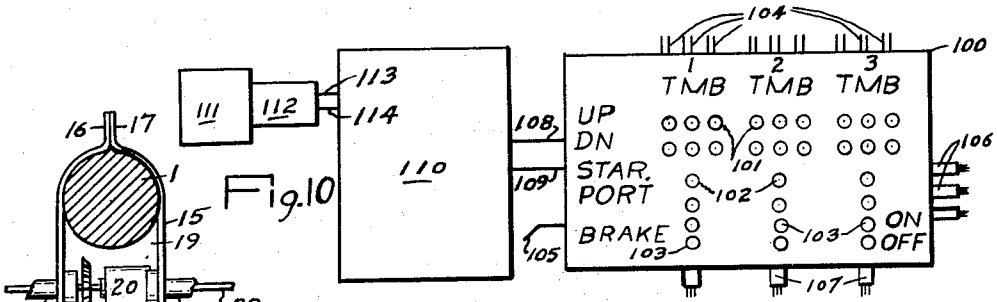


Fig. 10

Fig. 8

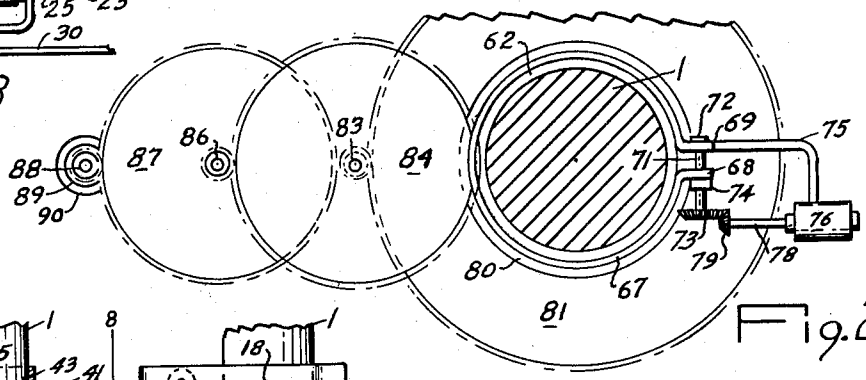


Fig. 2

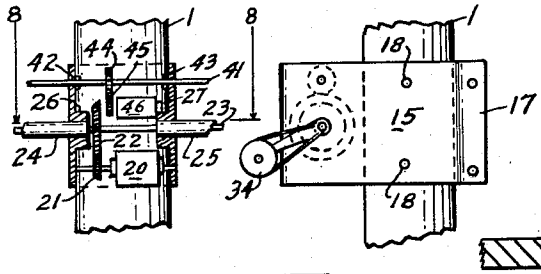
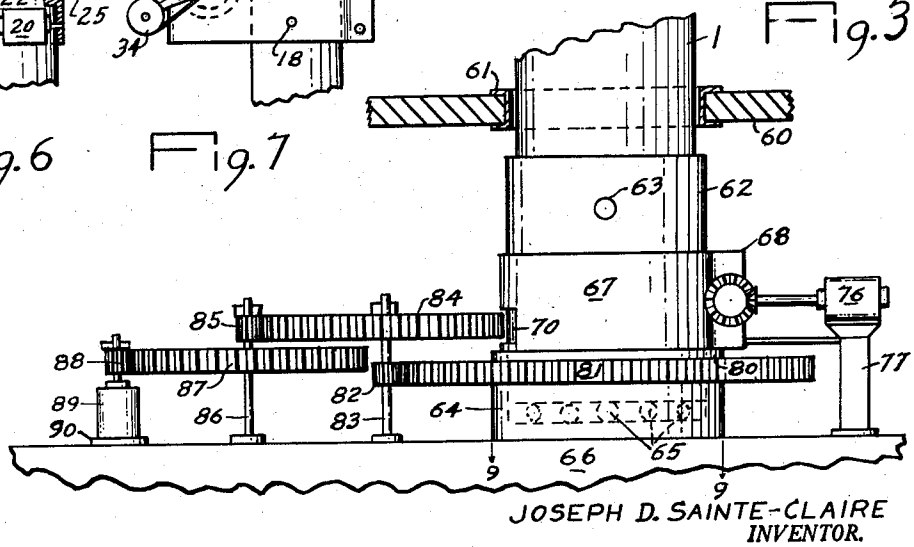


Fig. 6

Fig. 7

Fig. 3



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SAILING SHIP RIGGING AND ITS OPERATION

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2 Claims. (Cl. 114—102)

This invention relates to new and novel means for the spreading of sails on ships and the like and also for the rotation of their supporting means so that the sails can cut-the-wind at the desired angle in accordance with the best principles of navigating a sailing ship.

The invention is shown as combined with the well known clipper type of ship, but it is to be understood that the invention is applicable to any type of sailing ship or boat which employs wind power either alone or in combination with some other kind of power means. Many types of ships may employ this invention in combination with other means of propulsion, that is, the invention may be only an emergency type to be used only when the main power means breaks down or the fuel has been exhausted. Even large liners and freighters may wish to install the invention merely as an auxiliary means for propulsion. However, the invention is most useful upon barks, barkentines, clippers, yawls, ketches and schooners, to name but a few.

Clipper ships and similar types of ships require a large crew to handle the sails and adjust the various rigging necessary to such ships; but, applicant's invention when installed on clipper ships needs but a small crew, in fact, such large sailing ships can be efficiently operated by no more than a half dozen men. Savings in crew wages alone would be material indeed, but a further benefit accrues when the cargo space is materially enlarged by reducing the living quarters needed by the crew. Because of these advantages, clipper ships and the like can be so economically operated and maintained that such sailing ships can again profitably ride the high seas.

One of the principal objects of this invention is to provide means, methods and ways of furling and unfurling sails from a remote point on the ship and also from the same remote point cause rotation of the masts and their sails in either direction, that is, toward the port side or the starboard side. Such positioning of the sails enable them to catch all available wind power from their angular position with respect to the direction or course of the ship.

Another object is to provide a control point on a sailing vessel, preferably at the pilot's position, for furling and unfurling the sails through an operational means controlled entirely by but a single man and which man also sets the sails toward port or starboard.

Other objects of this invention will become apparent upon reading the specifications and claims.

In the drawings:

FIG. 1 is an elevational view of a clipper type sailing ship with the invention installed therein.

FIG. 2 is an enlarged plan view, parts broken away, and a part in section, showing just one of the masts.

FIG. 3 is an elevational view of that shown in FIG. 2 with parts in section and parts broken away; the scale being the same as that in FIG. 2.

FIG. 4 is an elevational view of one of the masts with some rigging and with parts broken away.

FIG. 5 is an elevational view of the upper part of FIG. 4 and at right angles thereto.

FIG. 6 is a sectional view on a smaller scale showing the upper part of that shown in FIG. 4, but with parts broken away to show some details.

FIG. 7 is an elevational view at right angles to that shown in FIG. 6.

FIG. 8 is a sectional view taken substantially along the line 8—8 of FIG. 6.

FIG. 9 is plan view showing a portion taken along the line 9—9 of FIG. 3.

FIG. 10 is a schematic layout showing the electrical control system.

As shown in FIG. 1 of the drawings, a clipper ship has the three masts 1, 2 and 3. Obviously the ship may have a more or less number of masts, but the three masts shown are sufficient to clearly describe the invention. Each mast has a square-like top sail T, a middle sail M and a bottom sail B. The typical bowsprit of this class of ship is indicated at 4. The forward jib sails are indicated in general by the reference characters 5, 6 and 7 and the aft-sail by 8. The hull is indicated by 9, the bow by 10 and the stern by 11. Showing of other parts of the ship's gear and construction are deemed unnecessary for purposes of a clear disclosure of the invention.

Firmly fixed and spaced apart along each mast there is a housing 13; these housings are substantially alike. The bottom housing 14 are somewhat different and this will be apparent when the invention is fully explained. The numeral 12 indicates the position of the pilot's wheel and also the preferred position of a control board to be explained later.

Each housing 13 consists of a heavy sheet of metal 15, shaped as best shown in FIG. 8, and having the ears 16 and 17 which are riveted or bolted together. The housing is fixed to the mast by bolts and the like as indicated at 18. Between the mast and the forward portion of the housing there is a chamber 19. Within the chamber there is an electric series wound motor 20 which has keyed to its shaft a pinion bevel gear 21 that is meshed with a larger gear 22. The gear 22 is keyed to a cross shaft 23 which has bearing relationship within cross spars 24 and 25. The inner ends of these cross spars are securely fixed to their respective housing bosses 26 and 27 so that these cross spars can carry their respective cantilever load, their respective spindles beneath and as well the sail supported thereon.

Near the outer ends of each spar there is fixed a bracket, note 28 and 29, and these brackets at their lower portions provide supporting bearings so that a cross spindle 30 can rotate therein. Note that the spindle is extended forwardly of the housing 13 so that the square-like sail therebelow can be wound thereon; for instance, sail M on mast 1 has its top edge securely fastened to the spindle so that when the cross shaft 23 rotates by means of the motor 20, the sail will be wound on to the spindle. The distal ends of the cross shafts 23 each have keyed thereto the sprockets 31 and 32, and similar sprockets, but larger, indicated at 33 and 34, are keyed to opposite ends of the spindle 30, so that when these sprockets rotate by means of the chain links 35 and 36, respectively, the canvas sail can be neatly wound upon the spindle. The top portions of all the sails are thus rigged.

The bottom corners of the sails are each provided with attached cables or ropes like 37 and 38 and which cables are adapted to wind upon their respective pulley or drum members 39 and 40 and to which the ends of the cables are attached. These drum members are keyed to the ends of a shaft 41 which has its bearing in the housing 13 at 42 and 43 as indicated early in FIG. 6. A large gear 44 is keyed to the shaft and this gear is in mesh with a pinion gear 45 that is keyed to the series wound electric motor 46. This motor is fixed to the housing in any suitable manner. When this motor is energized, the sail cables are wound neatly thereon and hence the sail is unfurled.

It should now be clear that the sails can be furled or unfurled by operation of the motors 20 and 46. Series wound electric direct current motors with a suitable resistance in the line are powerful and can work at a slow speed, however, in the event that the mechanical resistance

to rotation of either the furling or unfurling mechanism should prove too great, it may be necessary in such an event to provide shunt wound motors, that is, the field of the motor is shunted across the armature, but with the shunt lines leading to a reversal switch so that either motor can be operated in either direction of rotation. Thus, when motor 20 is operated in one direction to furl its sail, the motor 46 at the bottom of the sail is operated in the same direction. It would be necessary to run four lines to each motor instead of two lines should it be desired to provide reversible motors, two for the armature and two for the field.

The top sails T need not have the shaft 41 in its housing 13, therefore this shaft is omitted since there are no sails above. The bottom sails B need only a shaft and drums to wind the cables, therefore a smaller housing 14 is provided as shown in FIG. 4. This housing has fixed in the chamber thereof a series wound motor 47 with a pinion gear 48 keyed to its shaft and this gear is in mesh with a larger gear 49 that is keyed to the cross shaft 50. Cable winding members 51 and 52 are keyed at opposite ends of this shaft and to which members the cables of the bottom sails B are attached.

Each mast is supported and rotated in a similar manner, hence this explanation is directed to just mast 1. As illustrated in FIGS. 2 and 3, the mast 1 passes through one or more decks like the one indicated at 60 by means of an opening that is reenforced by a metal collar bearing means 61. The bottom end of the mast is fixed to a metal sleeve-like member 62 by means of one or more bolts 63. A roller bearing cup member 64, having roller bearings 65, is securely fixed in position by bolts or otherwise to a strong structural member 66 which may be a built-up portion from the keel of the ship or it may be a raised portion of the keel itself. In any event, the substructure for mounting the masts is a substantial part of the keep and hull of the ship.

An elastic metal band type of brake member 67 is provided around the lower end of each mast and has the ears 68 and 69 and a cutout portion 70 to accommodate a portion of one of the gears, as shown. A screw shaft 71 passes through alined bores in the ears and has a head 72 on one end and a gear 73 keyed to the other end. This screw shaft passes through a threaded bore in a block member 74 that is securely fixed to the ear 68 by welding or other suitable means. Rotation of the shaft in one direction will draw the ears together and in the other direction separate the ears so that the mast can be securely held in non-rotatable position by the brake band 62. The ear 69 is held in fixed position by a bracket means 75 that has one end fixed to the ear 69 and its other end fixed to a base 77 of the reversible motor 76; this base being fixed to a suitable portion of the ship's structure 66. This motor has a shaft 78 which has its distal end keyed to a pinion gear 79 that is in mesh with the gear 73, as shown. According to this arrangement, the brake can be on or off by operation of the motor 76. A spacer rind 80 supports the brake band above a gear 81 to be presently explained.

The member 62 is a mast carrier and is free to rotate on the roller bearings 65 when the brake 67 is released. This carrier is keyed to a large gear 81 and this gear is meshed with a pinion gear 82 that is supported from the structural member 66 by the upright standard 83. Keyed to the top end of this standard is a large gear 84 which is in mesh with a pinion gear 85 supported by the standard 86. Beneath gear 85, a large gear 87 is journalled to the standard and this gear is in mesh with a pinion gear 88 that is keyed to the upright shaft of a reversible motor 89. This motor is a heavy duty one and sufficient in power to rotate the mast in either direction. This motor is mounted upon a heavy base plate 90 which is securely fixed to the structural part 66 of the ship. This gear arrangement is such that a 1725 revolution per minute motor would turn the mast only one revolution

per minute, therefore, the mast can be turned very slowly in either direction to an angle of ninety degrees so as to catch wind from any angle with respect to the keel of the ship.

A control panel 100 is provided and adapted to be set at any desired position on the ship, but it is believed its logical position would be immediately forward of the pilot's wheel or to either side of the wheel so that the pilot can always conveniently control the furling and unfurling of the sails and the angular position of the unfurled sails. The top row of numerals indicate the masts 1, 2 and 3. Immediately below the mast numbers are grouped the sails on its respective mast such as "T" for top sail, "M" for middle sail and "B" for bottom sail. Obviously, should more or less sails be employed on the masts, other indicating means may be used.

Below the above indicator means, are two rows of spring return button type switches with a pair of button switches for each sail. The "Up" row is for furling the sails and the "DN" row for unfurling the sails. These buttons are indicated by the reference character 101. Further down the panel, there are two rows of switch buttons 102 which control the motor 89 for turning the various masts in either direction. The top row turning the masts toward starboard and the other row turns them to the port side. Along the bottom edge of the panel are brake switches indicated by 103 which are also spring-return type button switches so that the brake can be "on" for the braking action, and "off" for releasing the effectiveness of the brake.

Each switch button 101 has a switch leg wire or electrical conductor to its respective motor for operating its said and the return conductor for all power units is a common one and indicated at 105. Each cable 106 has a three-some set of conductors to its mast turning motor 89. One of the conductors leading to the armature of the motor and the other two leading to the shunt field of the motor so that these shunt lines can be crossed for changing the direction of the motor. The return from the armature is the common conductor 105. The cables 107 contain three conductors in that they also control their reversible motors 76 for braking and unbraking their respective masts.

All the feed conductors in the panel are connected together and lead to the 115 volt storage battery bank 110. The conductors to the bank are indicated at 108 and 109. A suitable power engine is shown at 111 which may be a diesel engine of sufficient horsepower to rotate a direct current generator or dynamo 112 when delivering full capacity current to all the related motors and other uses on the ship. The conductors connecting the output of the generator to the storage battery bank is shown at 113 and 114. The engine is provided with all necessary controls including automatic means to start it when the line voltage falls below a certain predetermined amount which is likely to be 115 volts.

Certain novel features and details of this invention are disclosed herein, and in some cases in considerable detail, in at least one form thereof. However, it is to be clearly understood that the invention, as disclosed, is not necessarily limited to the exact form and details disclosed since it is apparent that various modifications and changes may be made without departing from the spirit and scope of the claims of this invention.

Having thus described my invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A sailing ship having one or more masts provided with one or more sails each, each sail having a spindle means along its top edge, means supporting the spindle means to the mast, power means controlled from a remote point on the ship for rotating the spindle means so as to roll and unroll the sail thereon, each mast having a bearing means including a gear of large diameter at the bottom of the mast, and power means controlled from a remote point of the ship for turning the mast so that

the sails can be disposed angularly with respect to the keel of the ship, the power means comprising a pinion gear meshed with a train of gears and which are meshed with the gear of large diameter so that the mast can be turned slowly by a normally high speed power means, and wherein the power means for furling and unfurling the sail is fixed to a housing that is firmly fixed to its respective mast.

2. A ship having a mast with a sail, structural means extending from the mast to which the top edge of the sail is attached, power means fixed to the mast near the structural means for winding the sail onto the structural means, the structural means consisting of a pair of spaced apart spars extending from the mast, one of the spars comprising a spindle to which the top of the sail is attached and adapted to accommodate the sail when furled, and lower spar means extending from the mast well spaced below the structural means, the lower spar means

having drum means at its ends, and cable means extending downwardly from the lower corners of the sail and which cables have their lower ends attached to their respective drum means so that when the drum means are rotated, the cables are wound thereon and thus pull the sail downwardly for unfurling it.

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